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ABSTRACT

This paper describes how Deming's theory of management can be applied to the educational process. Following an overview of Deming's theory, nine specific questions to ask any theory of education are posed. The differences between education and industry, as well as the differences between quality management and traditional educational approaches, are described. The following contents of education are discussed--vision, knowledge, know-how, wisdom, and character. Suggestions for getting started in the school and classroom are offered. Principles that can be carried over from the industrial experience to education include the "process first" principle and "cease dependence on mass inspection." In conclusion, the teacher's main objective is to put quality into education, which is what makes learning a pleasure and a joy. Putting quality into education means constant change and engagement. Five figures and three tables are included. (LMI)

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TQM in Education
The Theory and How To Put It to Work

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Introduction

W. Edwards Deming has often said, "Experience alone teaches nothing." If you do not have a theory to provide a framework to understand your experience, you do not accumulate 30 years of experience; you merely repeat one year 30 times.

In discussing the application of Total Quality Management (TQM) in education, it is useful to distinguish between management and leadership. Both are needed. Dalton[1] has proposed the following definitions:

> **Leadership** is the ability to develop a vision that motivates others to move with a passion.
>
> **Management** is the ability to organize resources and coordinate the execution of tasks necessary to reach a goal in a timely and cost effective manner.

Both leadership and management are required. Covey contrasts them using the following example:[2]

> *You can quickly grasp the important difference between the two if you envision a group of producers cutting their way through the jungle with machetes. They're the producers, the problem solvers. They're cutting through the undergrowth, clearing it out.*
>
> *The managers are behind them, sharpening their machetes, writing policy and procedure manuals, holding muscle development programs, bringing in improved technologies and setting up working schedules and compensation programs for machete wielders.*
>
> *The leader is the one who climbs the tallest tree, surveys the entire situation, and yells, "Wrong jungle!"*
>
> *But how do the busy, efficient producers and managers often respond? "Shut up! We're making progress."*

By "theory", we mean a connected set of concepts, residing in our heads. The concepts represent our image of "reality". We use them to make predictions about how our future depends on our actions.

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[1] Dalton, James F. LEADERSHIP SKILLS, a videotaped lecture, available from the National Society of Professional Engineers, 1420 King Street, Alexandria, VA 22314 (703) 684 2882

[2] Covey, Stephen R. "7 Habits of Highly Effective People", Simon and Schuster, New York, 1989, pg 101

EA 025733

The purpose of this essay is to describe how the theory of management developed by W. Edwards Deming may be applied to the educational process. The theory was originally developed to improve the management of manufacturing enterprises. Over time has been extended to service industries, government and even not-for-profit enterprises. It is important to consider how best to apply the theory to education. The school is not a factory.

By What Criteria Should We Judge a Theory of Management in Education?

There is no shortage of proposals for reform in education. Nor is there a shortage of good ideas and research results. The task is not just to pick one of them, but rather it is to develop a comprehensive approach within which to implement the many good works known to us. The theory of management developed by W. Edwards Deming provides an excellent framework within which to examine proposals for improvement.

Any theory of education reflects the philosophy, either explicitly or implicitly, of the philosopher. Education is the means whereby adults pass on to children their beliefs, values and desires for the future. Whatever is done in education represents a philosophy and a system of values,; our beliefs regarding the good, the true and the beautiful.

The Deming Theory of Management is based on a very humanistic philosophy. It begins with the belief that all people are educable, that they want to do a good job and they deserve respect. They are not born mean, but can be made so. The philosophy behind the Deming approach values the self esteem of those who learn and those who teach.

The Deming Theory of Management goes beyond the historical views of management in specifically recognizing the impact of the system on the behavior of people. Deming often cites a rule he attributes to Juran:

When there is a problem,
85% of the time it is with the system.
15% of the time it will be with the workers.

Lately Dr. Deming has suggested that the numbers should be 95% and 5%. To deal with a problem, therefore, Deming advises to begin with an examination of the system which, an overwhelming amount of the time, he argues, is the source of the problem.

Concern for how people respond to managerial actions is crucial to the success of quality management, which is why Deming emphasizes the need for managers to understand elementary principles of psychology and the scientific basis for these principles. Deming's view takes into account statistical variation. He calls for management by fact, which implies data taking and statistical analysis of the data before decisions are made.

Because Deming views systems as the means whereby human wealth and happiness may be obtained, he warns against managerial actions which lead to less than optimum system performance. He especially argues against managing each component as though it were separate from the others, an approach which occurs, for example, when accountants try to make each activity its own "profit center". He warns against approaches which pit the person against the system or against other persons. Deming believes in personal responsibility, but goes beyond that concept to consider the special responsibilities of those who manage systems. Conventional approaches to management, i.e., as discussed in Fortune Magazine, often dwell upon the rewards of management, e.g., by publishing annual salary surveys. Deming dwells upon the obligations of management.

A satisfactory theory of education should address the teaching/learning processes as central to the mission of the institution, and it should bring to bear on these processes tools for improvement. The theory should also address the related issues of parental participation, school administration, teacher training and evaluation. A satisfactory theory, therefore, should be "holistic". The theory should take into account research in the field of education and social sciences. The theory should have a scientific basis, but it should also have a moralistic basis. It should be based on an understanding of what is fair and what is good for society, even if these determinations in specific situations are not always easy to make.

The fruits of education occur in the future. A good system for the management of education demands a long range perspective. Long range planning requires consistency of purpose, communicated to all through a vision of what the enterprise ought to be. A really good system of management will alter the goals and objectives of the educational system, recognizing trends and changes in the environment. In spite of change, the *basic philosophies of management and teaching* should remain constant. Moving from the one room school house to the computer based modern school should call for a change in *methods*, but not for a change in *objectives* and *philosophy*.

Some Specific Questions to Ask of any Theory of Education

If presented with a theory of management in education, ask:

1. On what philosophy is it based? Is the philosophy explicit?

2. What is the implied set of values behind the theory?

3. What vision of the future motivates the theory?

4. Is the theory *holistic*, i.e., does it recognize education as a system? Does it deal with the teaching/learning processes? With the responsibilities of leadership and management?

5. Is the theory based upon, and does it make explicit use of:
   a) Psychology of people, taken individually and in groups?
   b) Systems theory?
   c) Statistical variation?
   d) A theory of knowledge?

6. Does it identify a particular set of tools and techniques to make it practical to reduce the theory to practice? Do these tools and techniques span the activities from teaching, learning, leading, managing, as well as relations with people outside the system?

7. Is the theory capable of being:
   a) *Descriptive*, i.e., provide language and concepts which help us understand what we see? Does it increase insight?
   b) *Predictive*, i.e., enable us to predict, with a reasonable probability, what will happen in the future? Does it help us to decide what to observe? Does it identify leading indicators of improvement?
   c) *Normative*, i.e., provide a guide to action without being proscriptive?

8. Has the theory ever been reduced to practice with good results?

9. Does the theory call for widespread participation and promote continuous learning on the part of everyone in the system, not just the students?

A holistic approach to management requires concern with the seven elements depicted in figure 1 below. [3] The omission of any one link in the chain renders the theory inoperable.

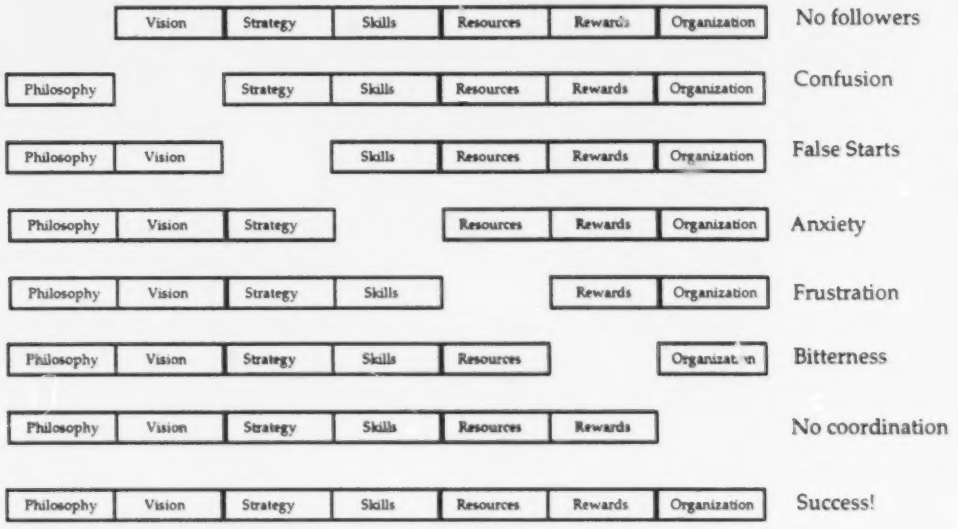

Figure 1. Seven elements required for quality management. Each has a function which cannot be omitted.

Any approach to education should be examined to see if it deals with all of the above seven elements.

How Do We Know It Will Work?

When teaching about quality management, Professor Shoji Shiba usually puts the following diagram on the board (Figure 2):

Figure 2. PITM is forbidden! PITM="Prove It To Me"

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[3]Adapted from: Ersoz, Clara Jean, M.D., St. Clair Hospital, "TQM: Healthcare's Roadmap to the 21st Century", presented at North Coast Quality Week, New Paradigms in Health, ERie, PA October 2, 1992

By "PITM" he refers to the expression, "Prove It To Me". People often demand that we prove, ahead of time, that quality management will work in their enterprise. They say, "Sure, it works in industry. But can you prove it works in education?" Dr. Deming habitually responds to such questions with the remark "Survival is not mandatory." He knows there are some things which one cannot "prove". To "prove" is to demonstrate, by words and logic, that something is true. No one can prove a theory. We can disprove theories in many ways. For example, we can prove logical inconsistency, or supply counterexamples. But we cannot prove a theory. Even if we point to years and years of social research supporting our contentions, it does not provide proof.

We can often point to experiments, conducted in systems which were only partially organized for quality management, but these are capable of many interpretations and do not serve as proof. They do not persuade those who are doubtful. In many areas of life, "proof" that a normative theory works can only be *experiential*. For example, unless you have experienced cooperative learning, or independent study, in competitive-free environments, there is no way anyone can "prove" to you that cooperative education really works. The best we can say is: "Try it. Give it a chance. You'll like it."

Moving the Theory from Industry to Education

In adapting quality management, originally developed for business enterprises, it is important to keep in mind certain differences between education and business:

- The school is not a factory.
- The student is not a "product".
- The education of the student is the product.
- Successful completion of the product requires the student to participate as a worker, co-managing the learning process.
- Teaching and learning are two different processes.

  Teaching is more akin to management than to detailed supervision of activities.

  Learning is more akin to research and development (R&D) than it is to an assembly process. Attempts to organize R&D as though it were merely an assembly of ideas to be managed in the style of an assembly line have been disastrous. The same is true in education.

- In industry, quality management requires every manager of every process to identify a customer. If a process has no output for which there is a customer, why do it?

  Educators are not habituated to the concept of "customer". They are apt to believe that a process should continue because "we've always done it that way."

There are many "customers" for the product, i.e., for the student's education. In order of importance they are:

1. The students, themselves, for they must live with the product for the rest of their lives..
2. Their parents, for they, too, must live with the product and

they are the ones who, in general, pay for it.

3. Future employers, who will have to pay to obtain the benefits of the student's education.
4 Society in general, as represented by governmental agencies, which pay a large fraction of the cost of the education and desire, therefore, that the student, as an adult, becomes a contributing member of society.

What Should a Good Education Provide for Learners?

The objective of every school, or university, should be to provide, for each student, opportunities to develop in four categories:

- **Knowledge**, which enables us to understand.
- **Know how**, which enables us to do.
- **Wisdom**, which enables us to set priorities.
- **Character**, which enables us to cooperate, to persevere and to become respected and trusted members of society.

We refer to these four components as the **contents** of the education. A theory of management for education should consider not only the contents, but also the system, environment, style and processes required to deliver the contents. Because the contents will vary from school to school and community to community, the theory addresses how the contents are determined.

How Does Quality Management Differ?

Existing approaches to management in education do pay attention to both the contents, which too often considers topics, such as mathematics, science, art, English and history as independent topics, not part of a *system*. Likewise, existing approaches treat the method of delivery too often merely in terms of the physical environment, the schedule and the methods of testing. What distinguishes quality management from conventional management are these considerations:

1 Concern to define achievement by reference to the purpose of education, not standardized tests.
2 Concern for processes instead of organizations, to make form follow function.
3 Concern for improvement of processes instead of working only on outputs.
4 Concern to involve all players in the improvement process, not just the faculty.
5 Concern that every person in the system understands how the system works, what the system is supposed to do and how well it is doing it.
6 Concern to optimize the performance of the system as contrasted to optimizing components of the system, i.e., beyond raising scores in specially identified subjects.
7 Concern that every person is educated to participate in the improvement process, i.e., that everyone becomes response-able. Too often conventional approaches to management are concerned only to identify people who are responsible. Quality management is more concerned to fix the system than to fix the blame.

In industry we have learned to pay close attention to the processes which produce the goods and services. The important principle derived from industrial experience is:

**If you want to improve a product or service,
pay close attention to the processes which produce the product or service.
Measurements on the product or service provide, at best,
lagging indicators. They are too late to provide more than regrets.
Measuring the characteristics of the process provides leading indicators
upon which actions may be taken to insure a good result.**

A keystone in the Deming Philosophy is the continuous improvement of all processes. It is not important to identify, at any one moment, the best process someone else has developed. Rather, the enterprise and its managers should learn to develop the habit of continuous improvement. Any theory of management which seeks the best process for delivering a service, and then organizes itself to keep that process constant with time is suspect.[4] Although today there is much attention paid to "bench marking", that obsession should be understood as a crutch for managers who do not know how to make their organizations obsessive about improvement. The justification given by most managers, for their focus on "bench marking," is that it supplies a motivation for the workforce. "See how well they are doing it? We ought to be able to do at least as well!" An obsession with bench marking relieves the managers from having to lead the way in improvement and of having to inspire creativity in the workforce. If boards of directors understood their jobs, they would appoint as CEO's only those who have demonstrated their ability to lead people in the processes of improvement. School boards who understand quality would look first at candidates for Superintendent by asking for strong evidence of leadership coupled with good managerial skills.

The Importance of the Vision

Each of the categories of the contents will be considered in turn, but before they can be discussed meaningfully, it is important to discuss why the vision of the future is so important. (See figure 1) A vision for education must look ahead, to the time when the education will be put to use, and consider the threats and opportunities those being educated will face. The choice of what to include under the headings of *knowledge, know-how, wisdom* and *character*, will depend upon this vision of the future.

It is not enough to have a vision which relates to how the contents of education should change. It is also necessary to understand the changes required for the educational system itself. Under quality management there is much less of a focus on the curriculum. Rather the question is, how should the system change to adapt to, and possibly influence, the future? The vision should not only anticipate the future, but should aim to meet the future in the best possible way.

Educational systems are complex. Teachers are professionals and should be so treated. Teaching and learning is what takes place when the teacher closes the door and starts to speak. The test of a vision for a school is the extent to which it influences what happens behind the closed doors.

Two Official Visions of the Future--America 2000 and the SCANS report.

The Federal Administration in Washington has produced two rather different visions for education. The Secretary of Education has published "America 2000", which emphasizes national testing, high standards for math and science, and improved control over the physical

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[4] Tribus, Myron "Deming's Way", Quality First, NSPE Publication #1459, 4th Edition, National Institute for Engineering Management & Systems, 1420 King Street, Alexandria, VA 22314

environment in schools, specifically reduced drugs, greater safety, and better preparation for schooling.

The second vision is from the Secretary of Labor and is known as "A SCANS Report for America 2000" [5].

Table 2
The SCANS Report

WORKPLACE KNOW-HOW

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities that are needed for solid job performance. These include:

COMPETENCIES--effective workers can productively use:

- **Resources**--allocating time, money, materials, space and staff;
- **Interpersonal Skills**--working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
- **Information**--acquiring and evaluating data, organizing and maintaining files, interpreting and communicating and using computers to process information;
- **Systems**--understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;
- **Technology**--selecting equipment and tools, applying technology to specific tasks and maintaining and troubleshooting technologies.

THE FOUNDATION--competence requires:

- **Basic Skills**--reading, writing, arithmetic and mathematics, speaking, and listening.
- **Thinking Skills**--thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning.
- **Personal Qualities**--individual responsibility, self-esteem, sociability, self-management and integrity.

In an addendum to the original SCANS report[6], the Department of Labor has identified the following changes as desirable for K-12 education:

- Teaching should be offered "in context", that is, students should learn content while solving realistic problems. "Learning in order to know" should not be separated from "learning in order to do."

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[5] What Work Requires of Schools. A SCANS report for America 2000 The Secretary's Commison on Achieving Necessary Skills, U. S. Department of Labor, June 1991

[6] Learning a Living: A Blueprint for High Performance" April 1992, U. S. Department of Labor.

- Improving the match between what work requires and what students are taught requires changing how instruction is delivered and how students learn.
- High performance requires a new system of school administration and assessment.
- The entire community must be involved.

The vision of the U. S. Department of Education, is basically a call for a return to older paradigms of education, with an emphasis on testing and competition. Within that framework, schools are encouraged to try something new, anything. The underlying premise of the America 2000 approach is that having schools compete with one another is "good". The free market approach to education is "good". Developing national testing programs, which score and rank one school against another is "good". America 2000 also calls for safe schools, elimination of drugs and other enhancements in the school environment. It is legitimate to ask: "Why hasn't this been undertaken earlier? Why are these *new* goals for the future?" I conclude that America 2000 does not begin with a vision of the future. It seems to be aimed only at repairing what is obviously wrong today. It is certainly a step in the right direction, but it represents a limited, near-term vision, at best eight years out.

The SCANS report, Table 2, on the other hand, presents a table of competencies which industrial representatives identified as necessary to a flexible, competent work force in the future. In my opinion it is a much better vision for the future of education and provides much better guidance to educators. **The proper test of a vision statement is not how high sounding it is but rather whether it helps those who are trying to fulfill the vision.**

One of the big advantages of the American system of education is that the U. S. Secretary of Education does not have very much power! Educational policy is in the province of the individual states, and within the states, often is set by counties and school districts. It seems to me that, for the health of the nation, we should nurture diversity in educational approaches. We nurture "seed banks" to assure that in the future, no matter what plant diseases may arise, there will be a multiplicity of seed types from which we may obtain new strains. Diversity in education should be reflected in the choices made with respect to the balance among knowledge, know-how, wisdom and character, as chosen by different school districts. I submit that it is healthy for the nation if different schools define these contents differently, but I also believe no school should omit any one of them.

My conclusion from studying the two reports is that it would be better for the country if the Department of Labor were combined with the U. S. Department of Education. In any case, neither department, fortunately has control over the contents of an education. The main point I would make in this regard is that while quality management uses techniques to assure that whatever is done is consistent with the aims and goals of the enterprise, it does not dictate these aims and goals. Thus, it seems to me incumbent on the local school boards and communities to decide for themselves what to include under the four headings: Knowledge, Know-how, Wisdom and Character.[7]

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[7] For an example of how one school system has met this challenge, see Connecticut's Common Core of Learning, adopted by the Connecticut State Board of Education, January 1987. The common core does not deal with wisdom and character, but it is a start.

Defining Levels of Competency is Essential to the Selection of What to Include Under the Headings: Knowledge and Know-How.

When discussing Knowledge and Know-How, it is important to define levels of competency associated with each. Thus, we may desire that children at the fourth grade become competent in using a computer but the level of competency to which we aspire for them should be different than for a university student. In The concept of *level of competency* is not new in education. We may use the following table to illustrate the idea[8]:

Level 1	Recall, Remembering knowledge Acquire by: Reading, viewing, listening Tell, name, list, define. Who? When? Where?
Level 2:	Understanding, Comprehension Develop by: Explaining, developing vocabulary, reflecting what has been said. Demonstrate by: Giving main idea, predicting, evaluating cause and effect.
Level 3	Problem solving, Given this, find that Develop by: Solving "text book type" problems. Demonstrate by: Solving problems on tests, proving relationships, formal presentations of solutions
Level 4	Creative application, Identifying problems in fuzzy situations. Creating new methods of solution for new classes of problems. Develop by: Problem formulation in a variety of circumstances. Demonstrate by: Original work, publishable in a journal or converted to product or service of use in the market or acclaimed by audiences.

When the school board, the superintendent, the principals, the parents and the teachers, with some student representation, develop a specification for the contents, it is essential that each competency be described with reference to a level, using an agreed upon scheme such as the one illustrated above.

Students should have a hand in the development of agreed upon descriptions of levels of competence. Only then can they become partners in improving the processes of teaching and learning. Of course the degree of participation will depend upon the ages of the learners. For adults the participation should be as equals. My colleague, Theresa Hicks, has demonstrated that students can contribute even at the level of the second grade. At this level, they require considerable coaching, of course, but the implications for their future development as response-able co-managers of their education, by this kind of participation are enormous.

A useful tool for specifying knowledge and know-how is the "Quality Characteristics Evolution Diagram" or tree diagram illustrated in the next figure.

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[8]Educators will recognize at once the relation of these definitions to Bloom's taxonomy.

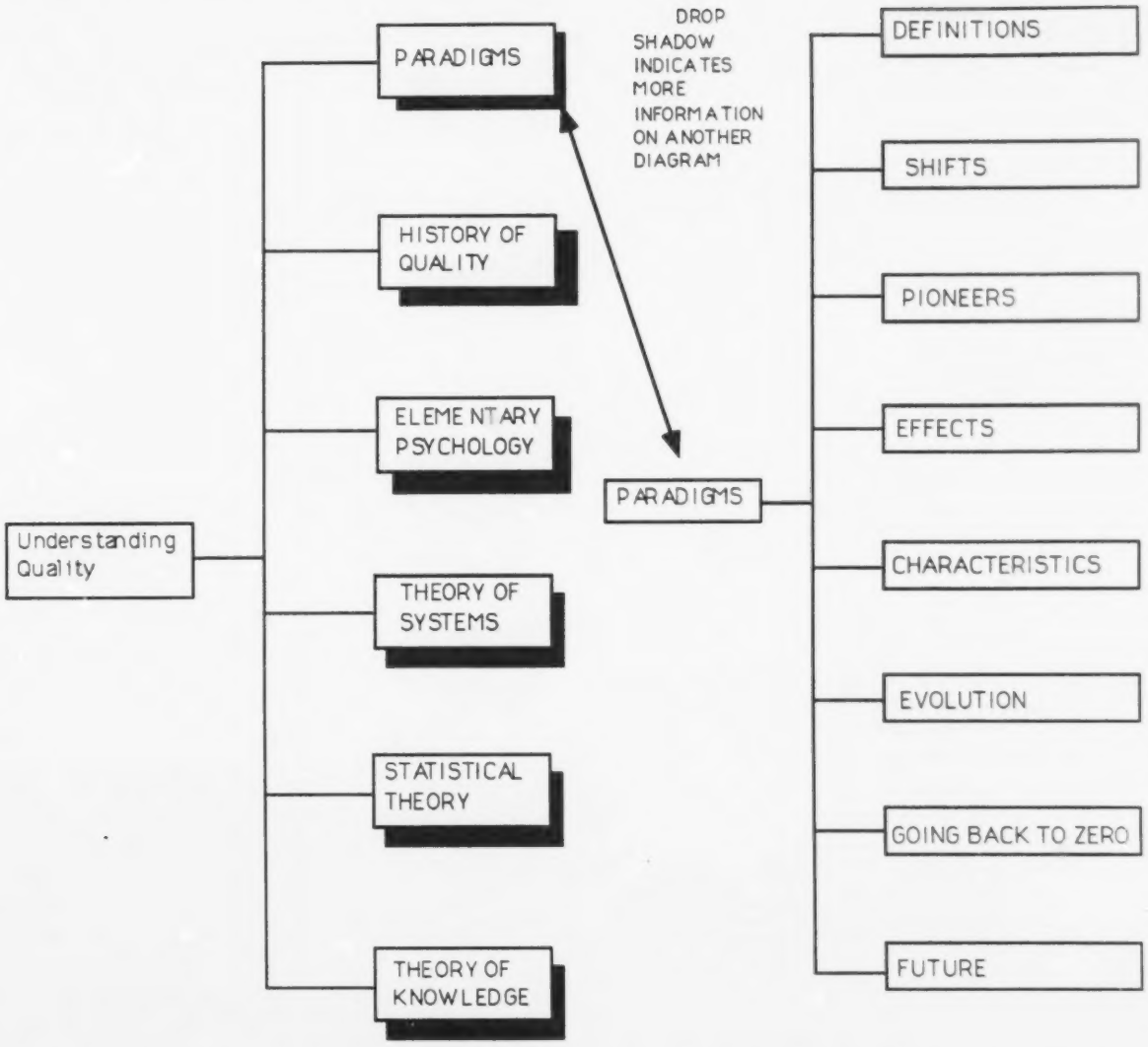

Figure 3. A quality characteristics evolution diagram. The drop shadow allows the diagram to deal with whatever level of detail is required without requiring a wall to display it. Thus the diagram to the right shows how the topic "Paradigms" would be expanded in another detailed tree structure. Each of the drop shadowed boxes is similarly expanded in another diagram.

Character

It is interesting to observe that the development of character is considered to be of paramount importance in kindergarten and the early grade school levels. As students move higher and higher in the educational system, wisdom and character receive less and less attention, until, at the level of the university, only the football coach seems to care about the development of character.

By character, we mean the collection of traits, such as:

Honesty	Initiative	Curiosity
Truthfulness	Integrity	Cooperativeness
Initiative	Self Esteem	Humility
Ability to work alone	Ability to work in groups	Perseverance
Trustworthiness	Conviction	Principled

Each school district should generate its own list of the character traits they wish to see in their students. The list should be developed with broad participation, including parents, representatives from industry, teachers, students and the administration.

The selection of desirable character traits will not always be easy. For example, there are questions in every community regarding religious and sex education. We are all aware, that the question of prayer in schools has been discussed ad nauseam but, no matter how the courts may rule and no matter how the matter may be decided *legally*, proponents of various view will not be silenced easily. Quality management techniques, such as nominal group technique, affinity diagrams and other methods to organize thinking about complex problems,[9] provide methods for developing a consensus on difficult issues.

Inquiry and Project Centered Education

The key to the development of wisdom and character is inquiry or project centered learning. Students should undertake to do something which they recognize as important and rewarding to do. It should be fun and, at the same time, serious. The project should have an output, such as a service or a product. It could even be a proposal for legislation. The output could be an improvement in an activity within the school. Whatever is undertaken, there should always be a customer for the output.

We visualize the quality managed school as developing its educational program around a number of student projects. Projects lend themselves to cooperative learning. Teachers and students can observe barriers to cooperation and can identify non-cooperative behavior.

Many educators have learned that when students engage in a project which serves others, it brings out the best in students. Even those who were previously seen to be "problems" perform better.

The main difficulty for most teachers and administrators in project oriented education is the changed relationship between teacher and learner. It is more difficult for the teacher to prepare a "lesson plan". In addition, methods to evaluate what has been learned are more subtle. In the old fashioned approach, the students may be observed sitting, silently, as the teacher presents tne information. Having presented a well defined content, the teacher then uses a standardized test to see what the students have retained. The results of a standard test allow comparisons to be made among students or with other classes and with national norms. Unfortunately, though the conventional approach is easier on teachers, and provides "objective numbers" which may make some people feel better or worse, it does not address the purposes of education.

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[9] see for example:
Scholtes, Peter R., et. al, The Team Handbook, Joiner Associates, P.O. Box 5445, Madison, Wisconsin, 53705-0445 (608) 238 8134 FAX: (608) 238 2908
Brassard, Michael, The Memory Jogger Plus+ GOAL/QPC 13 Branch Street, Methuen, MA 091844 (508) 685 3900 FAX: (508) 685 6151

National tests:

a) Do not touch upon the development of wisdom and character.
b) Do not deal with know-how,
c) Are harmful to the students (half of them are in the lower 50 percentile)
d) For students and teachers alike, teaching to achieve test scores is BORING!

The students at Mt. Edgecumbe High School, after a few years experience with quality management methods, developed the following table to illustrate the changed relationship between teacher and learner:

Table 3

Roles of Teachers and Students

.Teachers	DO TO	DO FOR	DO WITH	ENABLE
Students	No choice. Captive Antagonist	Captive, passive, dependent	Dependent, accepting follower	Independent Investigator, Seeker of Knowledge
	Let me out!	I'm OK	It's OK	Joy in learning

——» Direction of Increasing Autonomy ——»

The development of wisdom and character require different methods of instruction. This fact has been recognized in the second SCANS report. The differences are summarized in Table 4:

Table 4
The Conventional Classroom Compared with The SCANS Classroom

FROM THE CONVENTIONAL CLASSROOM	TO THE SCANS CLASSROOM
Teacher knows answers	More than one solution may be viable and teacher may not have it in advance.
Students routinely work alone	Students routinely work with teachers, peers and community members
Teacher plans all activities	Students and teachers plan and negotiate activities
Teacher makes all assessments	Students routinely assess themselves.
Information is organized, evaluated, interpreted and communicated to students by teacher.	Information is acquired, evaluated, organized, interpreted and communicated by students to appropriate audiences.
Organizing system of the classroom is simple: One teacher teaches 30 students.	Organizing systems are complex: teacher and students both reach out beyond school for additional information.

Reading, writing and math are treated as separate disciplines; listening and speaking often are missing from the curriculum.	Disciplines needed for problem solving are integrated; listening and speaking are fundamental parts of learning.
Thinking is usually theoretical and "academic"	Thinking involves problem solving, reasoning, and decision making.
Students are expected to conform to teacher's behavioral expectations; integrity and honesty are monitored by teacher; student self-esteem is often poor.	Students are expected to be responsible, sociable, self-managing, and resourceful; integrity and honesty are monitored within the social context of the classroom; students' self-esteem is high because they are in charge of their own learning.

Source: Fort Worth Public Schools

Specific Suggestions for Putting Quality Management to Work in Schools
Getting Started.

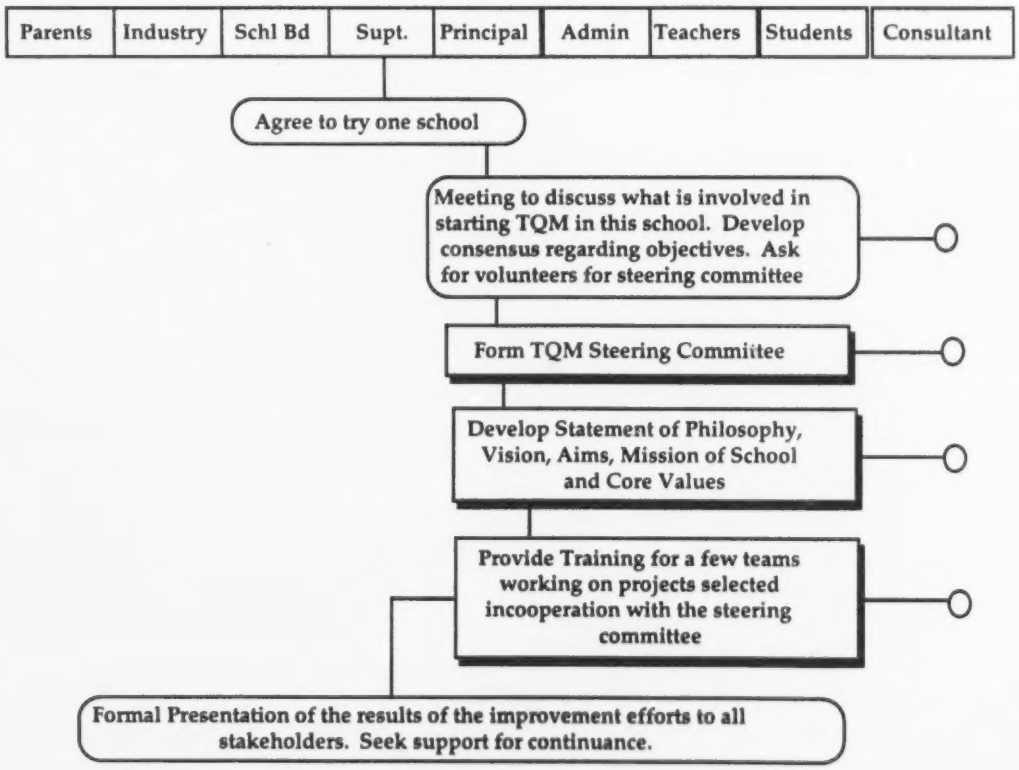
Parents
Industry
Schl Bd
Supt.
Principal
Admin
Teachers
Students
Consultant
Agree to try one school
Meeting to discuss what is involved in starting TQM in this school. Develop consensus regarding objectives. Ask for volunteers for steering committee
Form TQM Steering Committee
Develop Statement of Philosophy, Vision, Aims, Mission of School and Core Values
Provide Training for a few teams working on projects selected incooperation with the steering committee
Formal Presentation of the results of the improvement efforts to all stakeholders. Seek support for continuance.

Figure 4. One way to get started, with leadership from the top. (Based on a suggestion from Larrae Rocheleau, Superintendent of Mt. Edgecumbe High School, Sitka, Alaska) The arrows show who should provide leadership in the activities In this example, the school principal is the leader. The small circle indicates assistance from the consultant. A box represents a task. An elongated box with rounded ends represents a meeting. A "drop shadow" on a box indicates more detail is to be found on another diagram.

As indicated in figure 1, success requires that a number of elements be in place. Therefore, if quality management is to be successfully applied in schools, it is essential that the transformation be led by an administrator, i.e., superintendent, principal, headmaster or headmistress, etc., etc. What does that person do? Figure 4 presents a process for getting started. It is not the ONLY way to start, but it demonstrates some of the elements required for success. The chart in figure 4 illustrates one of the more powerful tools in quality management. The chart is called a "Deployment Flow Chart" because it shows how the people are deployed in connection with a task. Deployment Flow Charting displays the work and how the people interact with one another and the process. It is the only tool which displays these elements on one sheet of paper. The arrows leading into the boxes tell who should supply leadership. As with the quality characteristics evolution diagram, the drop shadow indicates that there is more detail to be found on another related diagram.

The objective is to bring about a state in which all elements of the school are working together in common purpose. This objective does not mean that it is impossible for an individual teacher to put some of the ideas to work in the classroom until everyone has agreed to the overall effort. If everyone waits for the leaders in education to start, we shall wait forever. Sometimes individual teachers have to begin anyway and do what they can. However, unless the entire system is changed, the work of an individual teacher will be frustrated. I would not advise teachers to wait until the entire system is improved before experimenting. Just be prepared for battles! We should be grateful to those hardy pioneers who went ahead anyhow, without waiting for the entire system to change before they tried quality management in their limited areas of control. They have provided us with tangible evidence that the approach works (in a limited way) and given us a glimpse of how things could be.

Getting Started in the Classroom

To a certain extent, the introduction of TQM in a school is more easily accomplished in connection with administration and maintenance, for these activities are similar to many activities already carried on in industry. In these kinds of applications, it will be possible to obtain considerable help from people in industry who are already practicing quality management. Locate nearby companies which are already involved in TQM. Experience shows they are more than willing to help. Examples of applications of TQM in the administrative tasks of a University are given in a recent publication.[10]

Introducing TQM in the classroom, however, is more of a challenge. There are fewer people around to help. Although the new paradigm for quality education is different from the approaches mandated by many people in authority in the school system, it is not that far removed from what many teachers want to do but cannot because the system will not allow them. The AASA has established a network of people interested in TQM in education and those who wish to pioneer can obtain considerable help from others of like mind who have signed up for the network. All that is required is a fax machine and the address list.

Here are some things which characterize TQM in the classroom:

1. The Student as Co-Manager of the teaching/learning process.

The teacher and learner should, at the beginning of every session, and especially at the beginning of the semester, review and discuss their mutual objectives. The teacher should review and develop class consensus on the *knowledge, know-how, wisdom* and *character traits,* expected to be

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[10] Harris, John W. and Baggett, J. Mark, Editors Quality Quest in the Academic Process Published by Samford University, Birmingham, Alabama 35229, and by GOAL/QPC (1992)

developed. This is the most important step in the overall process, for without a consensus concerning what is to be done, it will not be possible to develop the cooperation so essential to co-management.

At the lowest levels, say in K-12, it is not usually necessary to argue with the children about what should be learned. Experience shows they are eager learners at that level, unless their home conditions have militated against it.[11] Experience with head start and similar programs provides examples of what to do to overcome this handicap. As one moves higher and higher in the system, there will be a point at which students are not eager to learn a particular subject. "Do I have to take Algebra?" If the answer is "Yes you must. It is required," the teacher may be asserting authority but it is unlikely that the student will be ready to give that extra effort which leads to a quality result. One of the most important tasks of a teacher is to provide a basis for internal motivation towards a subject. This is why the SCANS report emphasizes the doing of work as a part of learning. Applications of Algebra to every day life are plentiful and a good teacher can always show examples which will interest most students.

People learn best when they feel the need to know. Projects will inevitably deal with the need for algebraic manipulations and these ought to be introduced before students are formally introduced to algebra. With such experiences behind them, students are more likely to accept that it is a rational requirement. In the end, of course, people often have to "take" something they do not want and teachers cannot shun this responsibility. In a TQM managed school, however, this forced feeding will be a rare event.

An essential part of the consensus building is the definition of the levels of competence required. The teacher should have in mind some minimum level to be required of all students but should not inhibit those who wish to go beyond. Consensus should be established on how the competence is to be displayed, what the students have to do to demonstrate they have achieved the level of competence agreed upon, how they are expected to acquire it and what the teacher is expected to do to help. How the teacher and learner will know the competence has been attained should also be agreed upon.

Many teachers have had such poor experience with students that they do not believe that a consensus can be developed and that the students will then stick with it. Teachers have described their experiences in producing this consensus, even in inner city schools and with students from homes where there are drugs and child abuse. These reports are becoming available now and are most heartening.[12]

According to Theresa Hicks, who has been experimenting with this approach in the second grade, the children are fascinated with the chance to help set the rules. They will often help the teacher to establish better discipline, self discipline, than could be achieved before.[13] The teacher may have to intervene to prevent the children from becoming too harsh in dealing with those students who disturb the learning environment. The teacher may use these occasions as a way to introduce elementary considerations of psychology in a practical context.

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[11] Be aware, however, that some of the changes which occur under TQM will not sit well with all parents. We already know of instances in which parents who are proud of their childrn's report cards (all A's) are upset when grading is eliminated or reduced in importance. Some do not like cooperative learning.

[12] See listing of reports on TQM in education prepared by the AASA. Write or call to the editor of the Quality Network News.

[13] See, for example, Sachar, Emily Shut Up and Let the Lady Teach Poseidon Press, 1991

2. The Use of Internal Motivators Rather than External Motivators

One of the most difficult aspects to let go in the older paradigms in education is the use of external motivators to make the children do what is desired. "Spare the rod and spoil the child," lives on in the minds of many teachers and parents, even when physical abuse is prohibited by law. Teachers who pioneer in quality management in the classroom, and rely on intrinsic motivation, will have to deal with criticism from well meaning colleagues, parents, school boards and even some unenlightened employers.

For most teachers, the problem is not so much just to let go of the old ideas. Rather it is knowing what to do instead. So many of us are habituated to using external motivators, we often feel we are not doing our jobs if we leave them out. Some examples of unhealthy external motivators are:

a) Competitions for prizes
b) Grading students "on the curve".
c) Threats regarding poor performance.
d) Special honors for good performance.
e) Segregation of students into different classes by "ability"
f) Criticism without appreciation of accomplishment.

Internal motivators are called into play when a learner understands what it means to do something very well, has had a hand in setting the rules whereby an excellent job is to recognized, knows that there is someone who shares the joy of knowing the job was well done and is taught to self-assess the work as it is ongoing. The key is not just to make students *responsible,* it is to make them *response-able.*

When we say that students should be made *response-able,* we mean that the teacher should make certain the learner has available the tools required for self improvement and for improvement of processes. Older students can profit from the excellent book by Covey.[14]

There is pleasure in seeing self improvement when it has been documented. This is the strength of the Boy Scout merit badge system. The badge shows that the student has been examined by someone who agrees that the work done was of good quality. It was not part of a contest. Anyone who can do the required tasks can earn one. The standards are (or should be) rigorous. The examiner helps the youngster if the job is not right and provides coaching to get it right. The badge does not signify that someone else has been beaten. It signifies conquest of self.

A powerful stimulant to internal motivation is to be part of a team in which each member of the team relies on the output of the other team members. This self motivation, which is so evident in sporting events, also takes place in group projects. For example, a team of second graders decided, with encouragement from their teacher, to develop an inexpensive egg incubator which might be used to help protect endangered species. With this objective in mind, the team needed to investigate such topics as at what temperature to maintain the eggs, how to protect the eggs, what to do when the eggs hatch, etc., etc. Each student investigated a different part of the project and reported back to the group. The internal motivation was intense. Reading, listening, presentation skills were developed almost as a by-product.

The cooperative spirit can be quickly destroyed if the students are set to competing for grades.

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[14] See reference 2

The teacher should discuss with the students

a) the objectives for the class, in the development of wisdom and character

b) how the teacher and the students will know if they are progressing.

Of course this means the introduction of topics not normally introduced at the lowest grade levels, but the omission of this emphasis on the development of wisdom and character is a modern phenomenon. A review of the McGuffey readers used so widely at the turn of the century shows the deep concern for the development of character and wisdom our forefathers had. For a generation of youngsters growing up on farms, it probably worked, for a farmer cannot be of poor character and succeed. Nature is more unforgiving than an urban society. I do not propose to return to the McGuffey readers, for they are inappropriate to our times. The objectives remain; the means should change.

Some Principles Carried Over, Unchanged, From Industrial Experience

Experience in industry with quality management may be distilled into a few simple principles.

1) The Process First Principle

The quality of the product
Is determined by the quality
Of the process which produces it.
If you want to improve a product or service,
Concentrate on improving the process which produces it.

Assistant Principal Franklin P. Schargel of the George Westinghouse Vocational & Technical High School in Brooklyn gave me the following example of the application of this principle. The administration was concerned over the number of students failing their subjects. Student failures are extremely expensive, for they create increased costs in money, time and effort in later years. At some critical value of failure rate, the entire system will come to a halt.

The process leading to success or failure involves the giving of assignments, the discussion with students, the homework, the testing and the general interaction of the teacher with the class. A flow chart may be made by students and teachers, depicting the processes which occur between the time the student receives an assignment and it is completed and evaluated. A study of students who were failing showed that the critical problem for these children was their failure to do the homework. There were other problems, revolving around language, reading ability, etc., but a Pareto Diagram of the causes of failure showed that this was by far the largest item. To reduce failures, therefore, the learning processes of the failing students had to be changed. The causes behind the failure to do homework were examined, i.e., the process associated with just doing homework was studied in detail, and it was found that there were several reasons for failure to do homework, mostly beyond student control. [i.e., systems problems, Juran's principle.] Therefore, special time was set aside during the school day and student tutors were assigned. In short order the failure rate declined by half. By concentrating on the *processes* and not just increasing the pressure on teachers or students for the desired result, the failure rates were reduced.

At Mt. Edgecumbe High School, students were taught how to analyze their own study habits, after which the results on tests improved. But more important than that, they participated with their instructor in examining all aspects of the teaching/learning process. The teacher also changed what he was doing. By concentrating on the process, together they improved the product.

The Role of Tests and Testing

Deming's Point #3 is:

Cease dependence upon mass inspection.

This point translates directly into education. The change parallels what has been learned in industry. For years American managers hired inspectors to inspect the work of their employees. Quality did not really improve; rather the poor quality work did not get out. Costs went up and the customer saw mostly what was just good enough to pass inspection. Dr. Deming told me that when he went to Western Electric in the 1920's there were 30,000 people making telephone sets and 10,000 people inspecting their work. The job of the workers was to get their product past the inspectors and the job of the inspectors was to catch them if they did something wrong. This is no way to reduce cost. It is no way to achieve improved telephones. It is no way to work.

The only legitimate purpose of an examination in the classroom is to help the teacher and learner to decide what to do next.

Students and teachers should agree on what is to be accomplished, how it is to be judged, what level of competence is minimally acceptable and how it will be demonstrated. The phrase, "If it isn't perfect it isn't done" was coined by the students at Mt. Edgecumbe High School. This does not mean that all work is equivalent. Some students may aim for a higher level of accomplishment. For example, one student developed a computer program giving an encyclopedia like discussion of certain plants in Alaska. So did other students. Each student handed in perfect work but some students made much more extensive contributions than others.

Some people worry that without grades, potential employers will not be able to judge potential applicants for employment. But grades do not bear upon the competencies cited in the first SCANS report. Evidence of accomplishment should be developed by citing accomplishments. The second SCANS report referred to earlier, for example, proposes that each student develop a dossier, with accomplishments listed and signed by appropriate faculty and others, attesting the correctness of the descriptions. Students should aim to develop the best list of demonstrated competencies they can. The school should describe the minimum standards to which all students are held. This description should be in complete detail, insofar as the administration and faculty are prepared authenticate it. The SCANS report gives a sample dossier. This approach is much superior to the giving of grades and the ranking of students or schools.

A Method Whereby Students Help the Teacher to Improve the Learning Process

Figure 5 shows an adaptation of a "Quality Function Deployment" chart.

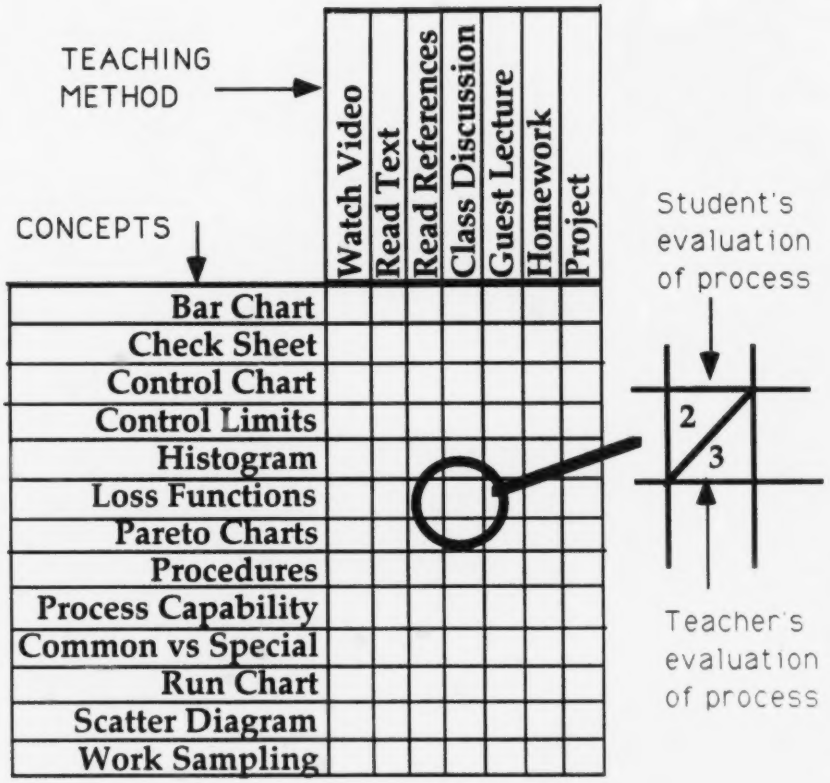

Figure 5. A QFD approach to improving the teaching/learning process[15].

In figure 5 the rows represent the elements of knowledge and know-how the teacher and students have agreed represent the learning objectives in the class. The columns represent the experiences the teacher has arranged for the students to have. The intersection of the row and column has room for two numbers. These numbers represent the students' and teacher's evaluations of how well the experience helped the student. The numbering system should be worked out (probably by a team of students) so that when numbers are assigned they have approximately the same meaning to everyone. The numbering system should be very crude, say 0 to 2 meaning "no value", "some value" to "very valuable". The numbers, in themselves, should not be given any significance, but the ratings can be the basis for discussion and improvement.

Conclusion

There are so many more aspects of quality in education that it requires a book to do justice to them. Remember that the main objective of the teacher is to put quality into education, which may well be defined as follows:

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[15]Special software for creating these charts on a PC or a Macintosh computer are under development by GOAL/QPC.

QUALITY in education is what makes learning a pleasure and a joy. Some measures of student performance may be increased by threats, by competition for grades or by prizes, but the attachment to learning will be unhealthy. It requires a quality experience to create an independent learner

JOY in learning is ever changing. What is thrilling at one age is infantile at another. Teachers must be ever alert to engage the students in a discussion of what constitutes a quality experience. The negotiations and discussions are never done.

It takes constant engagement to wed a student to learning.

I must close with a warning. Once people have learned to walk, they will not return to crawling. Once students have tasted the joy of learning in an educational institution which runs according to quality management principles, they will not accept something inferior. Up to this point in time I have met only a few students who have moved from a quality learning experience to the conventional classroom. There are so few of them they have no option but to keep a low profile while they seethe in anger. They tell me so. As the quality revolution in the classroom catches on and more students are produced who understand what quality in education can be, it is inevitable that they will reach a critical mass. When these students enter our universities in large numbers, they will make a difference, for that is the nature of their training. I look forward to that day.